

ANSWERS: Writing equations for conjugate acid/base pairs

1) i) CO_3^{2-} , OH^- , HCN

ii) $\text{HPO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{PO}_4^{3-} + \text{H}_3\text{O}^+$

$\text{HPO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{PO}_4^- + \text{OH}^-$

2) i) $\text{NH}_4^+ + \text{OH}^-$

ii) $\text{C}_2\text{H}_5\text{COOH} + \text{OH}^-$

3 i) $\text{NH}_4^+ / \text{NH}_3$ OR $\text{HPO}_4^{2-} / \text{PO}_4^{3-}$

ii)

(as acid) $\rightarrow \text{SO}_4^{2-} + \text{H}_3\text{O}^+$

(as base) $\rightarrow \text{H}_2\text{SO}_4 + \text{OH}^-$

4) (i) $\text{H}_3\text{O}^+ + \text{Cl}^-$

(ii) $\text{H}_3\text{O}^+ + \text{CH}_3\text{COO}^-$

5) i) $\rightarrow \text{NH}_3(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$

ii) $\rightarrow \text{F}^-(\text{aq}) + \text{H}_3\text{O}^+(\text{aq})$

6) $\text{CO}_3^{2-} (+ \text{H}_3\text{O}^+)$

$\text{H}_2\text{CO}_3 (+ \text{OH}^-)$

7) a) NH_3 , HPO_4^{2-} , HCl , H_2SO_4

b) It can donate **and** accept H^+

HCO_3^- , can donate H^+ , can accept H^+

OCl^- is basic or reacts with water or reacts to accept H^+ from water

c) $\text{OCl}^- + \text{H}_2\text{O} \rightleftharpoons \text{HOCl} + \text{OH}^-$

d) $[\text{OH}^-] > [\text{H}_3\text{O}^+]$ or $[\text{OH}^-]$ now increased.

8) a)

$\text{H}_2\text{CO}_3 / \text{HCO}_3^-$

$\text{H}_3\text{O}^+ / \text{H}_2\text{O}$

$\text{HCO}_3^- / \text{CO}_3^{2-}$

b) Equation 2

HCO_3^- is donating a proton / H^+